DOCUMENT RESUME

ED 181 314 CE 023 931

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TITLE A Manpower Development Model for an Emerging Technology: A Systems Approach to Curriculum Development for Solar Technician Training.
INSTITUTION Navarro Coll., Corsicana, Tex.
SPONS AGENCY Department of Energy, Washington, D.C.
PUB DATE Dec 79
NOTE 8p.: For related documents see CE 023 927 and CE 023 932

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS College Role: *Community Colleges: Conservation Education: *Curriculum Development: Demonstration Projects: Energy Conservation: *Feasibility Studies: Fuels: *Manpower Development: Manpower Needs: Postsecondary Education: Program Development: *Solar Radiation: Systems Approach: Task Analysis: Technical Education: *Technical Occupations
IDENTIFIERS Alcohol Fuels: *Emerging Occupations: Geothermal Energy: Wind Energy

ABSTRACT

Undertaking of a systems approach to curriculum development for solar training led to (1) a feasibility study to determine the role of the community college in solar energy technology, (2) a market analysis to determine the manpower need, and (3) a task analysis for development of a curriculum for training solar energy technicians at Navarro College. The feasibility study showed a need in industry for solar energy technicians and recommended a market survey and task analysis. Conclusions of the market study analysis were that there are two classes of solar workers (technician and installer/mechanic) and that the manpower forecast is a direct function of the demand for solar equipment. Diversification at the college has taken the form of a solar energy demonstration: implementation of a one-year certificate program to train solar energy installer/mechanics: three energy conservation projects--development of educational modules for energy conservation in buildings design and development of a curriculum in energy conservation for secondary and postsecondary vocational students, and pilot testing of the curriculum: a geothermal well demonstration: exploration of wind energy: and production and use of alcohol fuels. (YLB)

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ED181314

A MANPOWER DEVELOPMENT MODEL

FOR AN EMERGING TECHNCLOGY

A Systems Approach to Curriculum Development for Solar Technician Training

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December 1979

(CE023931)

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION

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A Systems Approach to Curriculum Development for Solar Technician Training

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OVERVIEW

The development of solar energy as a viable means of maintaining our technological society in a competitive posture through national energy self-sufficiency is a goal the United States is now pursing. The community/junior colleges throughout the country, because of the accessibility and service to the spectrum of the nation's population, can make a contribution to the solar industry by training the necessary manpower to insure that solar will become an integral part of our nation's energy portfolio.

Navarro College has taken a systems approach to solar training by conducting a feasibility study to determine the role of the community college in solar, has performed a market analysis to determine the manpower need in the field, and has conducted a task analysis. Navarro College is now developing a two-year associate degree curriculum for the National Science Foundation to train solar technicians. The curriculum will be pilot tested before dissemination nationally to interested community colleges.

FEASIBILITY

Intergovernmental cooperation has been achieved in all phases to date for the development of the solar curriculum. The Department of Occupational Research and Technology of the Texas Education Agency funded a feasibility study. The objective of the study was to determine the need for a vocational

education program in solar energy technology that will be used to train individuals in utilization of solar energy and solar energy devices as a source of power for commerical and residential construction.

The recommendations and conclusions of the study were:

1. that there exists an immediate need in industry for persons whose education, training and/or experience enables them to install, adjust, maintain, service, and repair solar heating and cooling systems.
2. a market survey be conducted to determine the employment opportunities in this field within the next five years.
3. that a task analysis be conducted to determine the skills that are required for the development of a vocational education program and curriculum for the training of solar energy technicians.

MARKET STUDY ANALYSIS

The Department of Energy funded a study to determine the market penetration and manpower assessment for the solar field. The project contract had three basic tasks:

Task 1. conduct a survey of solar heating and cooling systems equipment.

Task 2. review existing consumer demand studies to forecast manpower requirements.

Task 3. conduct a skills study to determine the type of curriculum required to produce the trained manpower identified in Task 2 above.

The final solar manpower assessment was formulated from the results of these three tasks.

The January 1978, Navarro College completed the study for the Department of Energy (DOE) and identified through a task analysis the skills required of solar workers, and the quantitative demand for those workers on a national scale.

The project had several conclusions: one, solar workers can be categorized into two distinct classes, solar technicians and solar installer/mechanics; two, the manpower forecast for the solar field is a direct function of the demand for solar equipment. The study also revealed that by 1985 there will be a need for 25,000 skilled workers to meet the market demand for solar equipment in the United States.

CURRICULUM DEVELOPMENT

The National Science Foundation funded the actual curriculum development phase. In 1977, Navarro College proposed a four year plan to the National Science Foundation to design, develop, implement, test, evaluate, and disseminate an associate degree curriculum to train solar engineering technicians. The total four year project was divided into three phases for funding purposes. Phase I, to design and devleop the curriculum, was funded by the National Science Foundation, began September 1, 1977, and was completed February 28, 1979. Phase II of the Project - Pilot Testing, Formative Evaluation, Revision and Dissemination of the First-Year Curriculum began March 1, 1979 and will run to August 31, 1980. Phase III - Pilot Testing, Formative Evaluation, Revision and Dissemination of the Entire Two-Year Curriculum is projected for September 1, 1980 to August 31, 1981.

DIVERSIFICATION

SOLAR ENERGY DEMONSTRATION

The systems approach to curriculum development to train solar technicians has lead to several related projects at Navarro College. In July 1977, Navarro College received funding from the Department of Housing and Urban Development to use solar for heating domestic hot water in one of the campus dormitories. The project not only provided for a federal demonstration project, it also afforded future students in the solar technician training program a hands-on laboratory for their use and an example of a functioning solar energy system. The project has given the college a visible means of demonstrating the potential of solar energy to the community's citizens and area schools.

SOLAR MECHANIC/INSTALLERS

In September 1978, Navarro College implemented a One-Year Certificate Program to Train Solar Energy Installer/Mechanics. The curriculum was designed as an outgrowth of the National Science Foundation Phase I Curriculum Development Project and reflects a skill mix of solar; heating, ventilating, and air conditioning; plumbing; sheet metal; and welding skills. The Texas Education Agency made available funds to implement the program which addresses the 20,000 job opportunities identified in the Department of Energy Manpower Assessment Study. These individuals will be those working for the solar technicians as installers and mechanics of solar energy equipment and devices. This program began its second cycle in September 1979.

ENERGY CONSERVATION

With the success in the development of solar energy as a viable means of alternate energy, Navarro College has begun broadening its interest in energy to other aspects of the issue. It has served on three energy conser-

vation projects: one as a Cooperating Institution to Brevard Community College on a Department of Energy project to develop educational modules for energy conservation in buildings. This project was completed in June 1978.

The second energy conservation project was awarded to Navarro College by the Texas Education Agency to Design and Develop a Curriculum in Energy Conservation to Train Secondary and Post-Secondary Vocational Students. There are eleven modules designed to be integrated into existing Vocational secondary and post-secondary programs as specific units of study, or to be combined into one course on energy conservation to be used by itself. This project was completed in January 1979. The third energy conservation project was awarded to Navarro College by the Texas Education Agency to pilot test the eleven module energy conservation curriculum in four secondary and four post-secondary institutions in Texas and South Carolina. It began September 1, 1979 and will continue through August 31, 1980.

GEOTHERMAL

Another alternate source of energy available to Navarro County and Corsicana is geothermal. A geothermal well has been dug funded by two local interested citizen benefactors. Work will begin shortly on a second well which will be used as the primary well, and the first well will be used as the injection well. The goal of the project is to serve the Navarro County Hospital and Navarro College Student Union Building with domestic hot water and limited space heating. The possibility of expanding the use to air conditioning has been discussed for the future. The Department of Energy has funded the actual implementation of this project over the next three years.

WIND

Wind energy is being explored at present for use in a total energy concept for Navarro College. Negotiations and discussions are taking place with West Texas State University.

ALCOHOL FUELS

Navarro College has received a grant from the Department of Energy to construct a prototype alcohol still and conduct workshops for its citizens and the citizens within DOE Region VI on the production and use of gasohol for the farmer. The project began November 1, 1979 and will continue through October 1980.

The total energy concept -- utilizing all forms of energy, both fossil fuel and alternate sources -- is an outgrowth and broadening of scope which Navarro College has evolved into through its experience in solar energy. Its commitment to this goal is a major objective in the overall planning of Navarro College.

IMPACT

The confidence in the technical capability of solar to make a major contribution to the energy need of our society is maturing. The technology is available in solar today to make that needed contribution. The economic aspect of the issue is a direct relationship to mass production and skilled manpower availability. Therefore, the economics of solar poses a major deterent to the broad scale utilization of this resource.

The community/junior colleges throughout the nation can be instrumental in alleviating one aspect of the economic contraints - trained manpower. The solar curriculum development project centered at Navarro College is a catylist, through national dissemination of the curriculum, by which the community college can respond to industry's needs for trained manpower in this emerging technology.